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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/233,073	01/19/1999	KENICHI NANBU	033082W001	8021
7590 02/10/2004 SMITH GAMBRELL & RUSSELL BEVERIDGE DEGRANDI WEILACHER & YOUNG INTELLECTUAL PROPERTY GROUP 1850 M STREET N W SUITE 800 WASHINGTON, DC 20036			EXAMINER VINH, LAN	
			ART UNIT 1765	PAPER NUMBER

DATE MAILED: 02/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/233,073

Applicant(s)

NANBU ET AL.

Examiner

Lan Vinh

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1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-6,8-10,12 and 15-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6,8-10,12 and 15-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
  - 2) ☒ Certified copies of the priority documents have been received in Application No. 09/233,073.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States

2. Claims 1, 3-4, 6, 9-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Szwejkowski et al (US 5,338,398)

Szwejkowski discloses a RIE process that uses chlorine gas as an etchant at a flow rate of approximately 13.3 sccm per liter (see col 4, lines 15-25). This flow rate according to the applicants, is useful for producing " a flow diverging position with respect to an outer periphery of an object being etched that is substantially at or internal to the outer periphery of the object being etched (page 7 of the specification).

Szwejkowski also discloses converting chlorine gas into a plasma that can be used to etch polysilicon (col 4, lines 22-25 and 38-40). Szwejkowski further discloses that its RIE process is performed in a vacuum apparatus such as the one disclosed in Cheng (Cheng is incorporated by reference at col 2, line 40 of Szwejkowski ). Cheng discloses a magnetic field enhanced plasma etch reactor used for RIE processes, such as those described in Szwejkowski (col 1, lines 10-16). The reactor has a plasma producing chamber (area 110) and a reaction chamber (areas where a wafer 75 is located , together with a evacuation system 106, a gas inlet system 81 and a clamping ring 78 (col 8, lines 3-12, fig. 7). The plasma producing chamber is supplied with RF energy to

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convert an etchant into a plasma useful for etching the wafer (col 5, lines 53-56; col 8, lines 5-11). Szejewski further discloses that the pressure in the etch chamber may range about 10 mTorr-100 mTorr (col 3, lines 33-34), which overlaps the claimed range of 5-10 mTorr)

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-6, 8, 12, 15-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Collins et al (US 5,556,501)

Collins discloses an ICP etching process that use chlorine gas to etch polysilicon (col 3, lines 40-50; col 22, lines 44-50). The plasma is initially formed by applying RF (radio frequency) power to chlorine gas in a first chamber (col 3, lines 45-48). The etching reaction occurs in the second chamber equipped with a vacuum system after the plasma is introduced (col 7, lines 39-45). The pressure of the first and second chamber are maintained between 2-20 mTorr (col 22, lines 44-50), which overlaps the claimed range of 5-10 mTorr

Collins does not specifically disclose applying the etching gas at a rate/flow rate that fall within the claimed range 8.4 sccm to 16.9 sccm/ a flow rate which produces a flow diverging position with respect to an outer periphery of an object being etched that is

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substantially at or internal to the outer periphery of the object being etched (according to page 7 of the specification).

However, throughout the disclosure, Collins emphasizes the importance of the flow rate of the etching gas in the ICP process. Collins, for example, employ multiple gas injection sources, with one exemplified flow rate of 50 cc to enhance the ICP etching process (col 9, lines 64-67; col 10, lines 1-5). Collins also discloses the use of a controller to monitor the condition during the ICP etching process, with such controller being geared to regulate the gas flow rate (col 18, lines 1-5). Thus, Collins serves as evidence that the flow rate is a result effective variable. It follows that the optimization of a result effective variable (flow rate) in the ICP process of Collins is deemed to be well within the ambit of one skilled in the art In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990). In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980 ) (holding that optimization is obvious when the variable to be optimized is recognized as a result effective variable)

The limitations of claims 2, 5, 12, 15-22 have been discussed above.

### ***Response to Arguments***

5. Applicant's arguments with respect to claims 1-6, 8-10, 12, 15-22 have been considered but are moot in view of the new ground(s) of rejection.

**Conclusion**

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV  
February 2, 2004